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THE CLASSIFICATION OF THE SCIENCES.

Philosophy as Scientia Scientiarum and a History of Classifications of the Sciences. By Robert Flint, D.D., LL.D., F.R.S.E. Pp. x+340. (Edinburgh and London : William Blackwood and Sons, 1904.) Price 10s. 6d. net.

THE relation of science to philosophy is, in theory, filial. It is, perhaps, no contradiction of the filial relationship that in practice it has an unfortunate tendency to run to mutual recrimination. The man of science too often ignores the philosopher, or despises him as an obscurantist who habitually confounds abstraction with generalisation. To the metaphysical philosopher, on the other hand, the typical specialist in science is a variety of day-labourer, dulled by the drudgery of occupational routine. Amidst such conjugal plain-speaking on both sides, it is no wonder that we hear much of what is called the divorce of philosophy and science; and yet there are many problems which for their adequate treatment surely require the combined resources of both science and philosophy. Is not the problem of the classification of the sciences one of these? Yet the comparative isolation of the scientific and philosophic approaches to this subject is a conspicuous fact, well attested by some recent instances. One of the most eminent of European men of science quite recently brought forward, as an original contribution, a scheme of classification which the philosophical critics at once detected as almost identical with that of Auguste Comte. Another very eminent man of science not long ago published a critical survey of some of the best known schemes of classification. His criticism of Comte's scheme was apparently based upon an allusion in the practical treatise (the "Positive Polity"), the critic himself being presumably in ignorance that Comte's treatment of the subject can only be adequately studied in the "Positive Philosophy," where indeed the general theory of science is so elaborately worked out as to extend over several volumes.

Then again, there is that stupendous work, the "International Catalogue of Scientific Literature," itself a classification of the (natural) sciences in being. For the taxonomic preparations antecedent to this, the Royal Society was mainly responsible. It would be interesting to know if the Royal Society, in preparing its scheme, consulted either the Aristotelian Society (as the leading corporate representative of philosophy in England), or any individual philosopher, known, like Herbert Spencer, to have made a special study of the classification of the sciences. Had a precedent been wanting for the explicit and formal cooperation of science and philosophy, a not unworthy one might have been cited in the collaboration of Whewell, sought and obtained by Lyell, for the classification and nomenclature of Tertiary geological strata.

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Prof. Flint's new book should serve as a mediating influence between philosophical and scientific interests. It brings together into one convenient source the leading attempts made, from Plato to Karl Pearson, towards a classification of the sciences. This, it seems, is the first time in the history of the subject that an exhaustive endeavour has been made to collect these data. How invaluable a service Prof. Flint has thus rendered to future investigators, can be appreciated only by those who have tediously toiled at the scattered literature of this subject. Its bibliography appears hitherto to have been left unorganised—having escaped even the ubiquitous zeal of German scholarship. As a special study, the classification of the sciences has been singularly little cultivated in Germany, though Wundt went too far when, first taking up the subject himself, about a generation ago, he declared that German sources were nil.

In point of purely taxonomic requirement, the first questions evoked by the problem of classification of the sciences are:—(1) What order of phenomena is it that falls to be classified? (2) Which (if any) amongst existing sciences deal with this particular order of phenomena? Can we, without leaving the assured ground of scientific method, adequately determine the first of these two questions? Does science itself yield criteria for determining its own order of phenomena? Science, to be sure, when self-contemplative, is more often in a postprandial mood than in a critical one. But when the man of science, in a metaphysical moment, does critically turn his eye inwards, and surveys the whole scientific domain, does he not see a manifold complexity of very partially analysed phenomena? Truth to tell, the evolution of science itself—i.e. its rationalised history and its methodology—considered as a department of scientific research, is one that has scarcely begun to be cultivated. It would be interesting, incidentally, to inquire whether the establishment of a chair of the "History of Science" in the Collège de France (due to positivist advocacy) has been followed by any similar initiative elsewhere; while as to methodology, what chance would even the most eminent amongst men of science have as a candidate for a chair of logic?

The few great men of science who have contributed to these departments of study have done so as philosophers rather than as men of science. Personal and individual views on the history and the methods of science—views of the first value and significance—have time and again been emitted, but there has scarcely yet been initiated in this field, that system of cooperative, impersonal, detached research which ensures continuity and consensus—the essential criteria of science. Not far short of a hundred systems of classification come within Prof. Flint's survey. The great majority of these have been put forward explicitly in the name of philosophy. Perhaps less than a dozen may be counted as having issued from professed men of science; and of these, each is, like the philosophical schemes, a personal and individual production, generated in comparative

isolation from other similar endeavours. Hence it is, that while there is no generally recognised system of arranging the sciences in any rational order, there is a whole series of competing pseudo-classifications, each characterised by the particular qualities and defects of its individual originator. One of the unfortunate results, is that the problem itself has fallen into some disrepute. Prof. Flint's book will help substantially to rescue the problem both from neglect and obloquy.

With existing resources, what tentative lines of orderly development may be discerned in the evolution of science which may help towards this preliminary problem of classification? Looking at the sciences collectively, and their field of investigation as a whole, we may without transcending scientific limits take several standpoints in turn. These may be held to include the following :—

(1) Science, collectively considered as a body of knowledge, differentiated from other bodies of knowledge (*e.g.* common knowledge on the one side and philosophy on the other) by its more systematic character, its greater quantitative precision, its more fully and explicitly known sources of origin and methods of growth, the more certain verifiability of its generalisations, the greater exactitude of its forecasts. Here, from this standpoint, science appears as a system of symbolism, a methodised scheme of notation, an organisation of interdependent formulæ—in short, a well-made language, as Condillac said.

(2) Science considered as a psychological process—*i.e.* as a power or faculty which, under certain definable conditions of heredity, training, and environment, the individual mind may acquire and utilise in the course of its normal growth. Here, from this standpoint, science appears as an artificial Psychic Organ, a portable illuminant like the miner's lamp, a racial eye adjustable to the individual brain—an eye that discerns the obscurities of the present, penetrates the past, and reveals the future. In short, science is here a rational development of instinct, by means of which the individual may be educated to possess himself more fully of the accumulated social heritage; and, in turn, more fully contribute to it, from his personal experience—the individual being here postulated as unique.

(3) Science considered as a social process, *i.e.* as a growth of racial experience, accumulated by an infinitude of contributions from cooperating individuals and generations in endless succession. It is a social process differing in its development from parallel growths of racial experience, chiefly in being more capable of consciously directed control and guidance, and therefore able to yield more verifiable ideals. Here, from this third point of view, science appears as a Social Institution, aiming at the organisation of communitary experience by a collective process in which the intervention of any given individual is a negligible quantity. The personality of the individual man of science is here to be observed as a social fact of a definitive order, and interpreted as itself the product of past and contemporary social evolution. The individual is here postulated, not as unique, but as

a type. The existing body of men of science make up, at any given moment, the temporary and evanescent personnel of one amongst abiding social institutions. They constitute one of a number of competing and cooperating social groups, composed of types of personality which are material for observation and study, like any other commensurable objects of natural history. And in this observational study of types of scientific personality would, of course, be included the corresponding study of their mental products—*i.e.* their contributions to science.

Here, then, are three aspects of science, under which it may approach the problem of its own structures and functions, its own history and ideals. The first approach is that of the nascent science of methodology (inheriting the philosophical traditions of logic and epistemology); the second is that of the well-established science of psychology; and the third, that of the nascent science of sociology (inheriting the traditions of philosophy of history and social philosophy). As each of these three sciences develops, it must, in pursuit of the first of scientific ideals—that of an over-evolving order—work out an increasingly natural classification of the phenomena with which it deals. The whole field of science would be surveyed from each of these points of view, and it would follow that in course of time there must emerge several classificatory schemes, each with a scientific status and validity of its own. But, given these several taxonomic systems—logical, psychological, sociological, and perhaps also æsthetic and ethical—there would, of course, remain the problem of their unification. Here surely would be scope for the activities of the philosopher; and yet the man of science would presumably decline to delegate that supreme taxonomic survey of his own domain. As sociologist, he may even propose a scientific survey of the philosophical field! For are not systems of philosophy themselves to be observed and classified as sociological facts, and interpreted as products and factors in social evolution?

What, then, is the right division of labour between science and philosophy? Is it not expressed in the simple and homely ideal—every man of science his own philosopher? Does not the existing fashion of exclusive devotion, either to speculation or to observation, tend to a multiplication of individuals who are neither philosophers nor men of science, but degenerate variants known to American psychologists as respectively “lumpers” and “splitters”? Is it not an alternation of speculation and observation, of the philosophical and the scientific mood, that most prolongs and intensifies each of these two complementary phases of mental activity? That surely is the lesson to be learned from the lives of the great initiators in science—of Faraday and Darwin, of Virchow and Helmholtz, of Bichat and Claude Bernard. The ordinary working man of science is ready enough, like Claude Bernard, to put off his imagination with his coat when he enters the laboratory. Only let him remember, like Claude Bernard, to put it on again when he leaves, for without it he cannot cultivate philosophy.